drama. The ground was bare; we were close by and could see every motion distinctly. Nothing more perfect could have been desired." For what followed we can only refer the reader to the book itself, wherein is told even how *Ammophila* used a tool in perfecting her nest.

In the concluding chapter the authors write: "Our study of the activities of wasps has satisfied us that it is impracticable to classify them in any simple way. The old notion that the acts of bees, wasps and ants were all varying forms of instinct is no longer tenable and must give way to a more philosophical view. It would appear to be quite certain that there are not only instinctive acts, but acts of intelligence as well, and a third variety also—acts that are probably due to imitation, although whether much or little intelligence accompanies this imitation is admittedly difficult to determine. Again, acts that are instinctive in one species may be intelligent in another, and we may even assert that there is considerable variation in the amount of intelligence displayed by different individuals of the same species."

The fact of great individual psychological variation is very clearly demonstrated throughout the book; but, since all the observations were made in the same immediate vicinity, it has not been possible to determine whether there exist psychological races among wasps, as among ourselves. It will remain for other observers to repeat the work of the Peckhams in many different localities, and see how far each species is constant over a wide range. There can be little doubt that variations in habits, to suit different environments, are much more common than we know; and it is also evident that psychological and physiological variations, not necessarily accompanied by gross morphological changes, must have a great deal to do with the manner and progress of evolution. Comparative studies in different localities may also explain habits which, studied in one place only, seem useless. Thus the Peckhams cannot explain why *Bembex* is so careful to hide the entrance of her nest, since in the case of the colony studied (on an island) there is apparently no enemy to be guarded against in this manner. It might prove, by studies elsewhere, that this was a device to conceal the nests from nocturnal mice or some other enemy of which we know nothing.

T. D. A. COCKERELL.

MESILLA PARK, N. M., November 10, 1898.

Four-footed Americans and their Kin. By MABEL OSGOOD WRIGHT. Edited by FRANK M. CHAPMAN. With 73 illustrations by ERNEST SETON THOMPSON. New York, The Macmillan Co. 1898. Pp. 432. Price, $1.50.

Among the many popular books on natural history that have appeared recently, very few have treated of mammals and none have been devoted exclusively to them. It is, therefore, gratifying to find in 'Four-footed Americans' an attractive, well-illustrated volume containing accounts of common North American mammals —accounts which, though primarily intended for children, must prove interesting and instructive to older persons.

The book is planned after the manner of 'Citizen Bird,'* by the same author, and is evidently intended as a companion volume. As in 'Citizen Bird,' the descriptions and life histories are presented by interesting characters in the form of stories, which, though not always spiced with adventure, are well calculated to attract young minds and create a wholesome interest in the animals for their own sakes. The spirit of the title is maintained throughout; it is emphatically American — an exceedingly creditable feature. In a household where such a book finds a place children are sure to grow up knowing and loving the animals of their own country.

The book closes with a 'Ladder for climbing the Family Tree of the North American Mammals' (presumably by the editor), which is an abridged and adapted classification, giving a few characters for the larger groups and indicating approximately the number of species of each family. In the few pages devoted to this 'Ladder' errors in typography and nomenclature are not infrequent. Conspicuous among these are the use of *Manatus* instead of *Trichechus*, *Dicotyles* instead of *Tayassu*, *Dorcelaphus* for *Odocoileus* and *Alces alces* for *Alces americanus*. Inaccuracies in the text, also apparently overlooked by the editor, are the statements

* Reviewed in SCIENCE, November 5, 1897, p. 706.

that *Desmodus* (called *Desmodon*) is no larger than our Little Red Bat and that bats do not migrate. The use of the name Least Shrew for *Sorex personatus* seems ill-advised, since there are at least two smaller species and several which do not exceed it in size. Aside from these minor criticisms, there is little but good to be said of the book as a whole. Mr. Thompson's illustrations are numerous and in the majority of cases splendidly executed; that they are well up to his own standard is sufficient commendation.

W. H. Osgood.

A Laboratory Guide in Qualitative Chemical Analysis. By H. L. Wells, M.A., Professor of Analytical Chemistry and Metallurgy in the Sheffield School of Yale University. New York, John Wiley & Sons. Pp. 200. $1.50.

A Short Course in Inorganic Qualitative Analysis for Engineering Students. By J. S. C. Wells, Ph.D., Instructor in Analytical Chemistry, Columbia University. New York, John Wiley & Sons.

Both of these books are new, and both are worthy to be picked out from the innumerable laboratory manuals as much above the average.

Professor H. L. Wells' laboratory guide is the most original and one of the best works on the subject, known to the reviewer.

In a 'notice to the student' in the first chapter of the book, the author says: "The object of this course is to introduce the subject of qualitative analysis in such a way as to develop the powers of observation, inductive reasoning and memory, and at the same time to give a knowledge of chemical facts and methods which will be of use in the future study of this and related subjects." The author's method is to have the student make and preserve a solution of a salt of each of the common bases. The student is then told to test the action of hydrochloric acid on each of these solutions; he finds that three yield a precipitate. Five cc. of each of these three is diluted with two volumes of water and again tested with hydrochloric acid; by further dilution and testing with acid, calculating in each case the amount of salt present, the quantitative limit of the reaction is studied. The student then takes in separate beakers a measured amount of each of the three original solutions, and in a fourth beaker a mixture of the three; all four are precipitated by the acid, filtered, and washed with boiling water. By addition of sulphuric acid to the filtrate from the mixed chlorides a precipitate is formed; by adding sulphuric acid to the filtrate from each of the other chlorides the student finds out which of the three constituents of the mixture caused the precipitation. The action of ammonia on the residues in the filters is then studied, and thus the student works out for himself the common scheme of analysis of the first group.

The other groups are worked out in a similar way; at every step the ingenuity of the author in presenting the problem to the student in the best way is worthy of notice.

The reactions of acids are studied in a similar manner. The book contains no tables, no abbreviated schemes, and everything is done to avoid mechanical work and to lead the student to independent thought. Fresenius' plan of analysis is followed, though various new methods are introduced. Constant references to Fresenius' 'Qualitative Analysis' foster the habit of consulting books of reference.

It is the belief of the reviewer that Professor Wells' method is admirable for students who can devote time enough to the subject, and it is to be hoped that teachers who have classes or single students in this position will give his book a trial.

The book of Dr. J. C. S. Wells, of Columbia, is quite different in character from that of the Yale professor. It is a careful and thorough work, designed for the use of those who can give little time to the subject. It endeavors by exceptionally full and clear descriptive text and tables of scheme reactions to teach qualitative analysis in the least time and with the least labor on the part of the student.

The advantages and disadvantages of the scheme-table system are apparent and have often been discussed. To those teachers who prefer the use of tables Dr. Wells' book can be recommended as one of the best of its kind.

Edward Renouf.

A Text-Book of Mineralogy. With an extended Treatise on Crystallography and Physical